CLAIMS

1. (Original) A micro-electrical-mechanical-switch, MEMS, monolithic semiconductor device comprising

a semiconductor wafer, a first dielectric layer formed on the semiconductor wafer, and a second semiconductor layer formed on the first layer;

a first latching movable shuttle formed in the second layer and having the first layer removed under the first shuttle, the first shuttle being moved in a first direction relative to the wafer in response to a predetermined acceleration of the MEMS device in a direction opposite to the first direction so as to change an operating condition of the MEMS device from a first switch state to an intermediate switch state;

a second latching moveable shuttle formed within the first shuttle, the second shuttle being moved in a second direction relative to the first shuttle in response to a thermally activated force so as to change the operating state of the MEMS device from the intermediate switch state to a second switch state; and

wherein in the second switch state an opening in the second shuttle aligns with an opening in the wafer to enable an optical signal to pass through the aligned openings.

2. (Original) The MEMS device of claim 1 further comprising

means for preventing the movement of the second shuttle prior to the movement of the first shuttle.

3. (Original) The MEMS device of claim 1 further comprising

an electrical switch for providing an electrical switch connection when the MEMS device is in the intermediate state.

4. (Original) The MEMS device of claim 1 further comprising

an absorbing stop formed in the second layer for limiting the movement of the first shuttle in the first direction.

5. (Original) The MEMS device of claim 1 further comprising

a thermal activator responsive to an electrical signal for generating the thermally activated force.

6. (Original) The MEMS device of claim 5 wherein the thermal activator includes one or more arms having a push-rod mounted perpendicular to the midpoint of the one or more arms and where in response to the passage of the electrical signal through the one or more arms, the one or more arms expand and deflect causing the push-rod to generate the thermally activated force.

7. (Original) The MEMS device of claim 1 wherein the second direction of movement is perpendicular to the first direction of movement.

8. (Original) The MEMS device of claim 1 wherein the semiconductor wafer is silicon, the first layer is silicon oxide and the second layer is silicon.

9. (Original) The MEMS device of claim 1 being formed by

A. first patterning and etching the movable elements in the second layer and stopping on the first dielectric layer,

B. patterning and etching a predetermined pattern in the semiconductor wafer from the bottom surface and stopping on the first dielectric layer,

C. etching away the exposed regions of the first dielectric layer, and

D. continuing this etch to allow undercutting sufficient to free the moveable elements from the semiconductor wafer.

10. (Currently amended) A micro-electrical-mechanical-switch, MEMS, monolithic semiconductor device comprising

a semiconductor wafer, a first electrically insulating layer formed on the semiconductor wafer, and a second semiconductor layer formed on the first layer;

a latching movable shuttle switch formed in the second layer and having the first layer removed under the shuttle switch, the shuttle switch being moved in a first direction relative to the wafer in response to a predetermined acceleration of the MEMS device in a direction opposite to the first direction, thereby changing an operating state of the shuttle switch, wherein the shuttle switch includes a first circular window formed therein which is vertically aligned but horizontally displaced from a second circular window formed in the wafer, and wherein in response to the MEMS device undergoing the predetermined acceleration the shuttle switch is moved so that the first circular window is horizontally moved in the first direction to be aligned over the second circular window, to thereby enable an optical signal to pass through the first and second circular windows.

11. (Original) The MEMS device of claim 10 wherein the shuttle switch includes

an electrical switch for providing an electrical switch connection when the MEMS device has undergone the predetermined acceleration.

12. (Canceled)

13. (Original) The MEMS device of claim 10 further comprising

an absorbing stop formed in the second layer for limiting the movement of the shuttle switch in the first direction.

14. (Original) The MEMS device of claim 10 wherein the semiconductor wafer is silicon, the first layer is silicon oxide and the second layer is silicon.

15. (Original) A method of operating a MEMS monolithic semiconductor device comprising a semiconductor wafer, a first dielectric layer formed on the semiconductor wafer, and a second semiconductor layer formed on the first layer, the method comprising the steps of:

latching a first movable shuttle formed in the second layer and having the first layer removed under the first movable shuttle, the first movable shuttle being moved in a first direction relative to the wafer in response to a predetermined acceleration of the MEMS device in a direction opposite to the first direction; the latched first movable shuttle changing a operating state of the MEMS switch from a first state to an intermediate state and

latching a second moveable shuttle formed within the first shuttle, the second shuttle being moved in a second direction relative to the first shuttle in response to a thermally activated force so as to change the operating state of the MEMS switch device from the intermediate state to a second state.

16. (New) The method of claim 15, wherein the step of latching the second moveable shuttle comprises pushing the second shuttle relative to the first shuttle in the second direction from a position corresponding to the intermediate state to a position corresponding to the second state with a movable rod formed in the second layer and adapted to move with respect to the first and second shuttles in response to said force.

17. (New) The MEMS device of claim 1, further comprising a movable rod formed in the second layer and adapted to move with respect to the first and second shuttles in response to said force such that the movable rod is adapted to push the second shuttle from a position corresponding to the intermediate switch state to a position corresponding to the second switch state.

18. (New) The MEMS device of claim 1, further comprising an electrical switch for providing an electrical switch connection, wherein said electrical switch is adapted to change its state upon the MEMS device transition from the first state to the intermediate state.

19. (New) The MEMS device of claim 1, wherein position of the second shuttle with respect to the first shuttle is unchanged upon transition from the first switch state to the intermediate switch state.

20. (New) The MEMS device of claim 1, wherein:

in the first switch state, the opening in the second shuttle is displaced from the opening in the wafer along the first and second directions; and

in the intermediate switch state, the opening in the second shuttle is displaced from the opening in the wafer along the second direction, but said openings are aligned with one another along the first direction.

21. (New) The MEMS device of claim 1, further comprising two or more springs, each connected between the first and second shuttles.